How SMS Printers are being used in Mozambique

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This article describes the use of the SMS printer as part of the Expedited Results System (ERS) which greatly improves the quality of Mozambique early infant diagnosis program.

SMS Printer is a small, portable, standalone device for receiving and printing messages sent to it. The unit works with most network providers and can be supplied in many different configurations.

In Mozambique, limited sample referral logistics, laboratory capacity and reduced numbers of skilled health care workers has led to long turn around times for critical Early Infant Diagnosis (EID) results, significantly delaying treatment initiation, and ultimately contributing unnecessarily to child mortality.

An innovative system was designed to allow laboratories to send test results directly to almost 300 health centres across the country. The Expedited Results System (ERS), which utilizes GPRS wireless technology and simple, inexpensive SMS Printers, vastly reduces the time and cost of transporting results from the laboratory to clinics. It is managed centrally by an administrative assistant, reducing the workload of skilled laboratory technicians. Confidentiality and the delivery of results are guaranteed through automated monitoring and evaluation software.

Preliminary results from the first phase of implementation in the urban setting of greater Maputo City showed a decrease in the average return time of completed EID results to patients from 85 to 33 days when using the ERS. The cost of transmitting each result using the SMS Printer that integrates GPRS technology is insignificant, even at high volume. As the evaluated health centres lie within a 20km radius of the reference laboratory and have relatively good logistics support, it is expected that the effect of the ERS will be even more dramatic for less resourced and more distant health centres.

The ERS was designed, piloted, and rolled out on a national basis in Mozambique in less than 10 months as the result of collaboration between government, partners, and the private sector. While initially created to accelerate EID results, other tests such as CD4 and tuberculosis are currently being integrated. This approach, now developed and tested, can be easily and rapidly transferred to other countries. A complete description of the system, including costs and procedures to implement will be shared.

The SMS printer allows you to send custom messages directly to the printer via a text message or website/web form. This has the advantage of using SMS or a GPRS connection to send the data to the printer, this results in a lower cost for each transaction and for custom fields to be sent to the printer.

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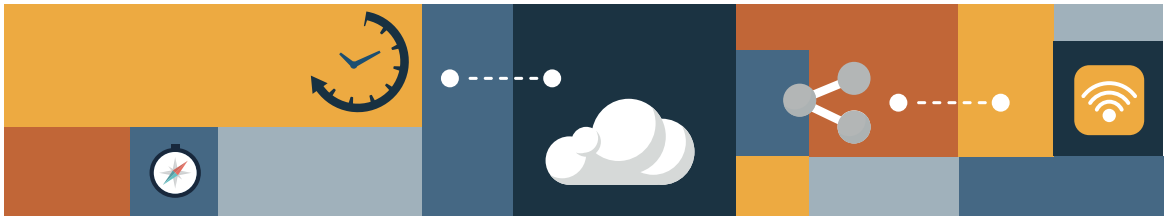


Innovative Expedited Results System (ERS) greatly improves quality of Mozambique Early Infant Diagnosis program

Issues

In Mozambique, limited sample referral logistics, insufficient laboratory capacity and minimal numbers of skilled health care workers led to undesirably long turn around times for critical Early Infant Diagnosis (EID) results, significantly delaying treatment initiation, and ultimately contributing to child mortality.

Description

From 2007 to 2009, Mozambique saw a rapid expansion of the National EID program to include over 235 health centres across the country (fig 1). However, transportation of samples and results between remote districts and two central laboratories often takes many weeks. To accelerate the return of results, an innovative system was designed to allow laboratories to print test results directly in any health centre with network coverage (fig 2). The Expedited Results System (ERS) utilizes GPRS technology and simple, inexpensive printers to vastly reduce the time and cost of transporting results from the laboratory to clinics. It is managed centrally by an administrative assistant, reducing the workload of skilled laboratory technicians. Confidentiality and the delivery of results are guaranteed through automated monitoring and evaluation software (fig 3).

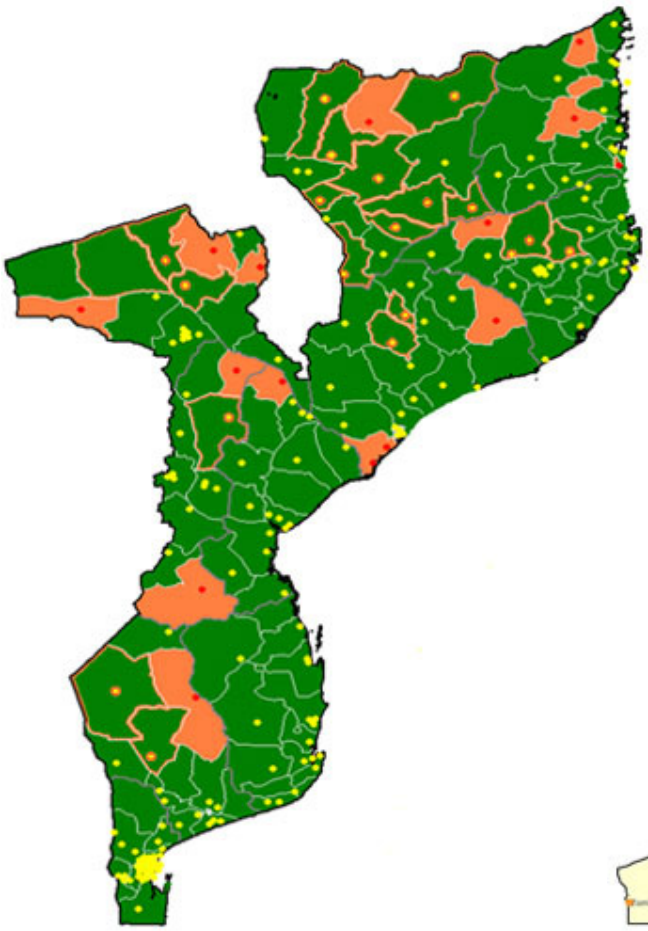


Figure 1. Distribution of health centres with EID benefiting from ERS in Mozambique.

Figure 2. MCEL GPRS network present at over 90% of health centres with EID.

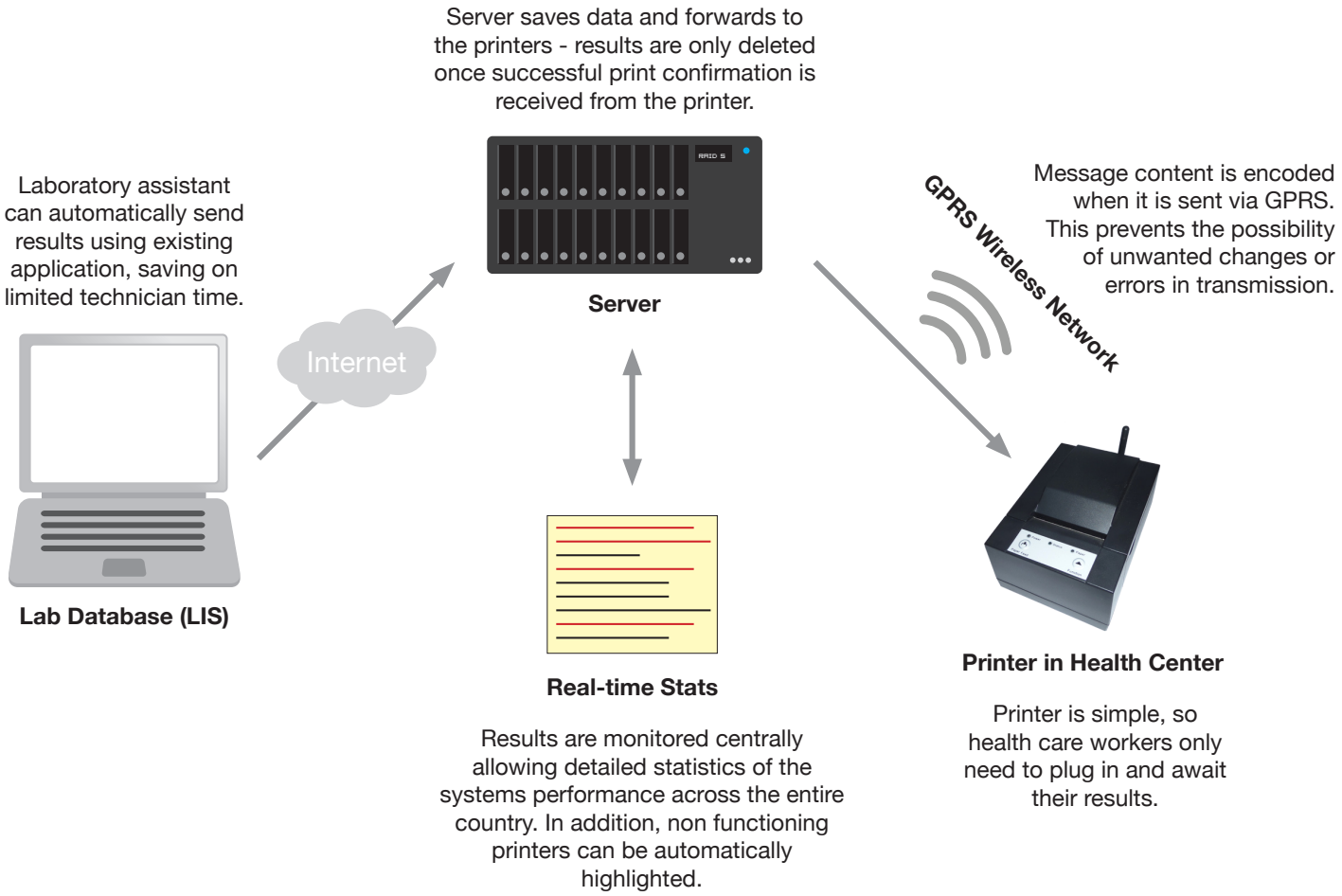


Figure 3. Flow diagram of results through the ERS: Patient data is entered into the lab database when samples are received. Once results are ready, they are sent from the database to a server, which in turn sends them through the GPRS network to printers located at each health centre. If a printer is unreachable, the results are retained in queue on the server and only deleted once print confirmation is received from the printer.

Lessons Learned

Pilot implementation of the ERS in greater Maputo city showed 100% successful transmission and printing of results, validating the system and monitoring software (fig 4). The impact on the return time of ready results to health centres, measured by comparing a group of test and control sites, was dramatic: a reduction from average 17-22 days to 1-3 days (fig 5). After ERS implementation in Oct 2009 and with improved sample processing times between Oct 2009 and Mar 2010, secondary downstream effects included reducing the time in which patients received EID results and enrolled in ART from over 6 months to less than 2 months (fig 6), and an increasing the percentage of infants enrolling in ART by over 60% (fig 7).

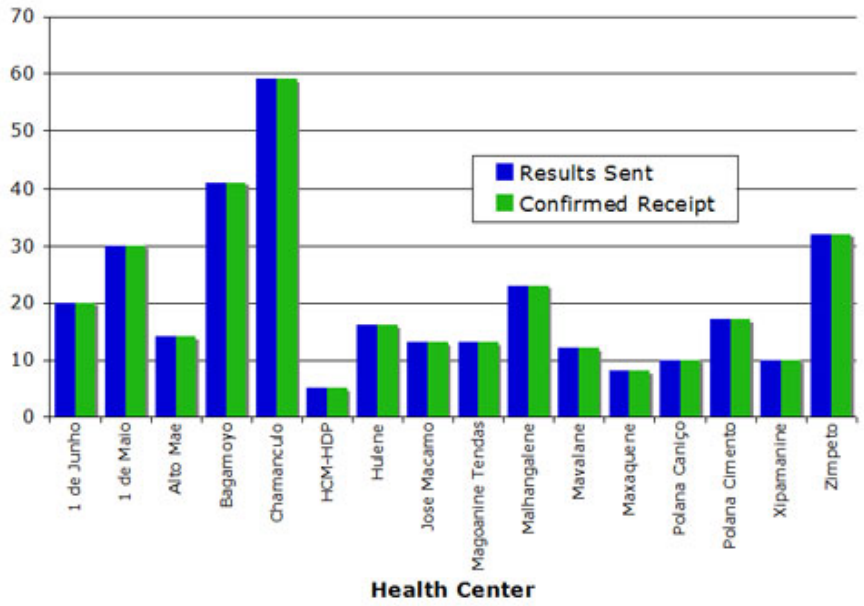
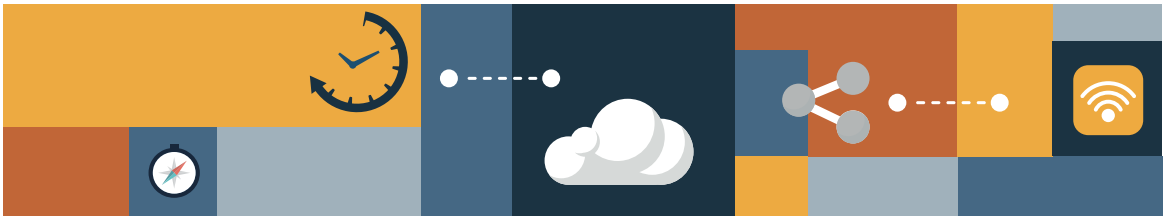


Figure 4. Quality and reliability of the ERS during a pilot in Maputo City: 16 health centres across greater Maputo were selected for a pilot to test the system quality and reliability. During the pilot period 323 results were sent from the lab, with 100% of these received and printed at their destined health centre.



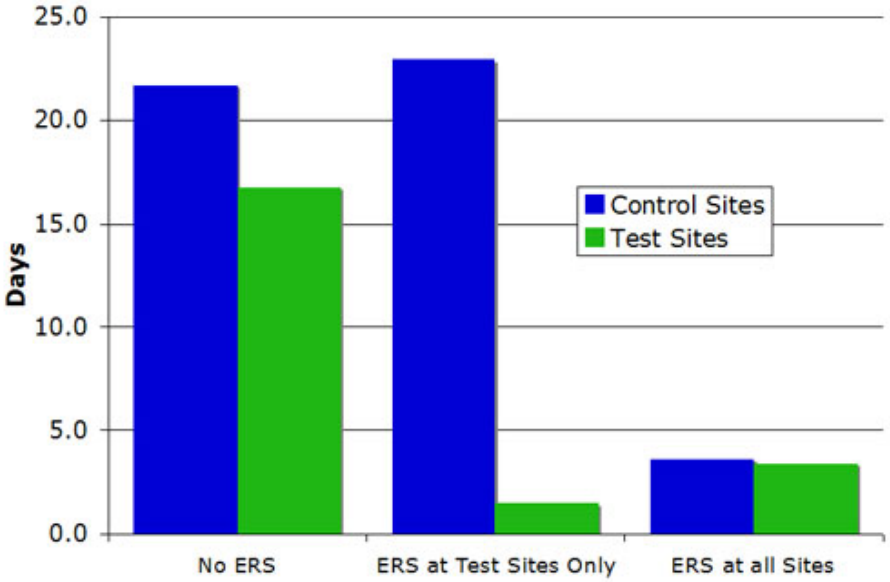
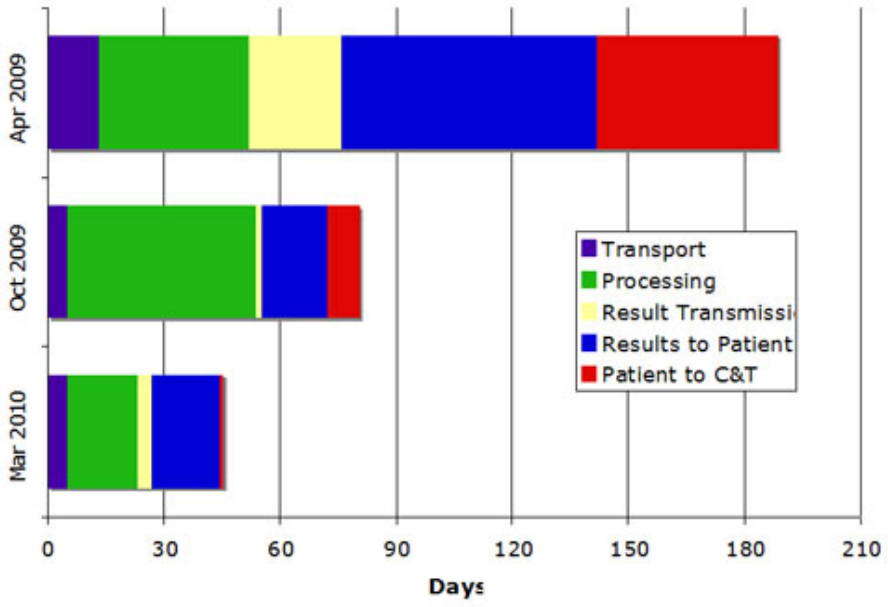
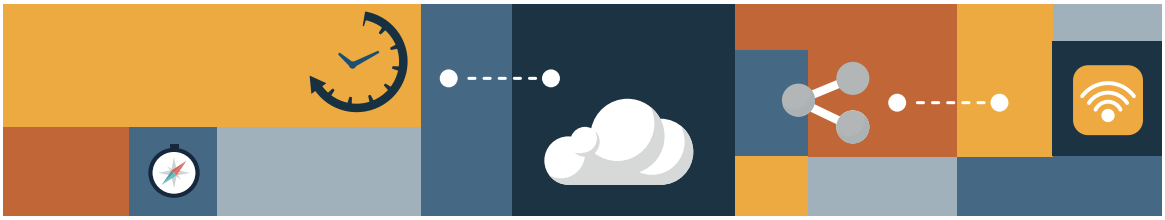


Figure 5. Impact of the ERS on delivery time of ready results: To examine the impact of the ERS on the delivery time of ready results, 7 health centres were selected and divided into control and test sites. The chart clearly shows the dramatic effect of using the ERS in place of the standard paper results transport system.

Figure 6. Impact of the ERS on the EID cascade: A review of 4 health centres evaluated the effects of the ERS on the entire EID process. The use of the ERS in Oct 2009 coupled with faster sample processing in Mar 2009 not only improved result delivery to sites but also to patients who more rapidly enrolled in ART.





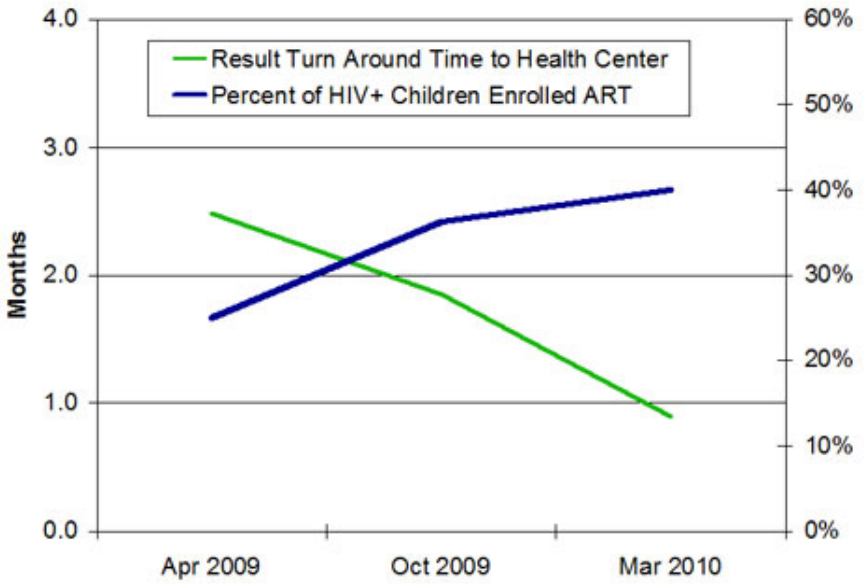
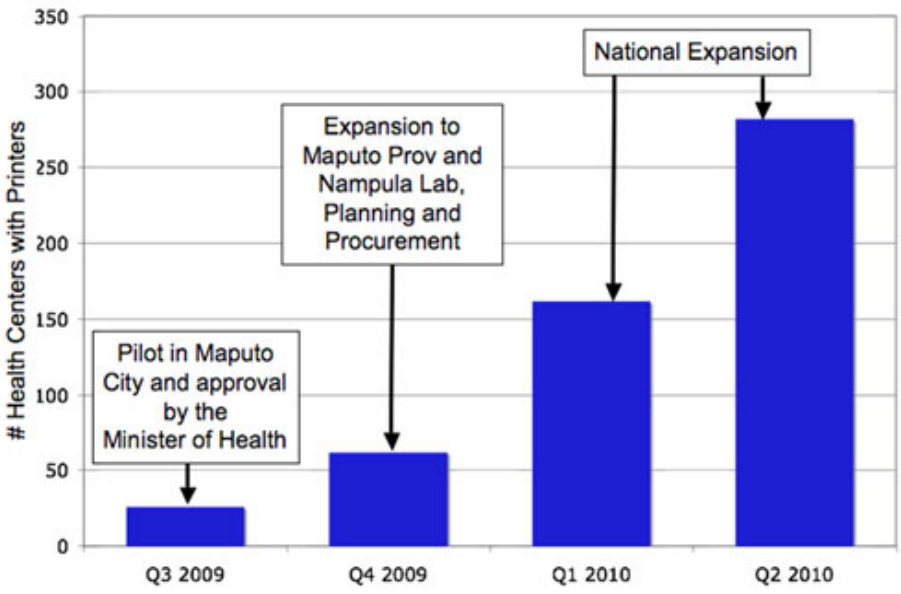
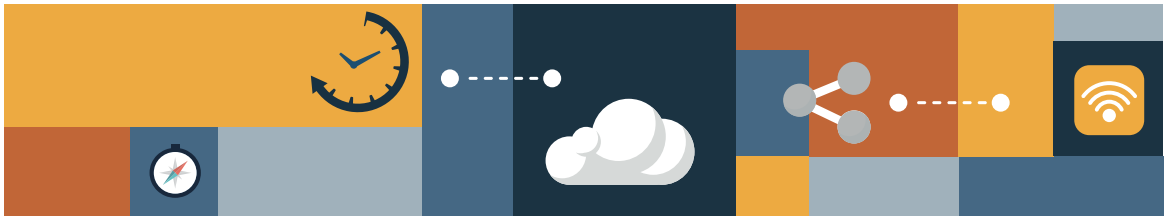


Figure 7. Impact of the ERS on Treatment Initiation: A review of 4 health centres established that the reduced time for results to return to the health centre from Apr 2009 to Mar 2010 contributed to a 60% increase in HIV+ children enrolling in ART.

Figure 8. Timeline of the ERS project development: Strong government commitment and coordinated partner support, along with simple operation and minimal training required, allowed the ERS to expand to over 275 health centres in less than 8 months after piloting.





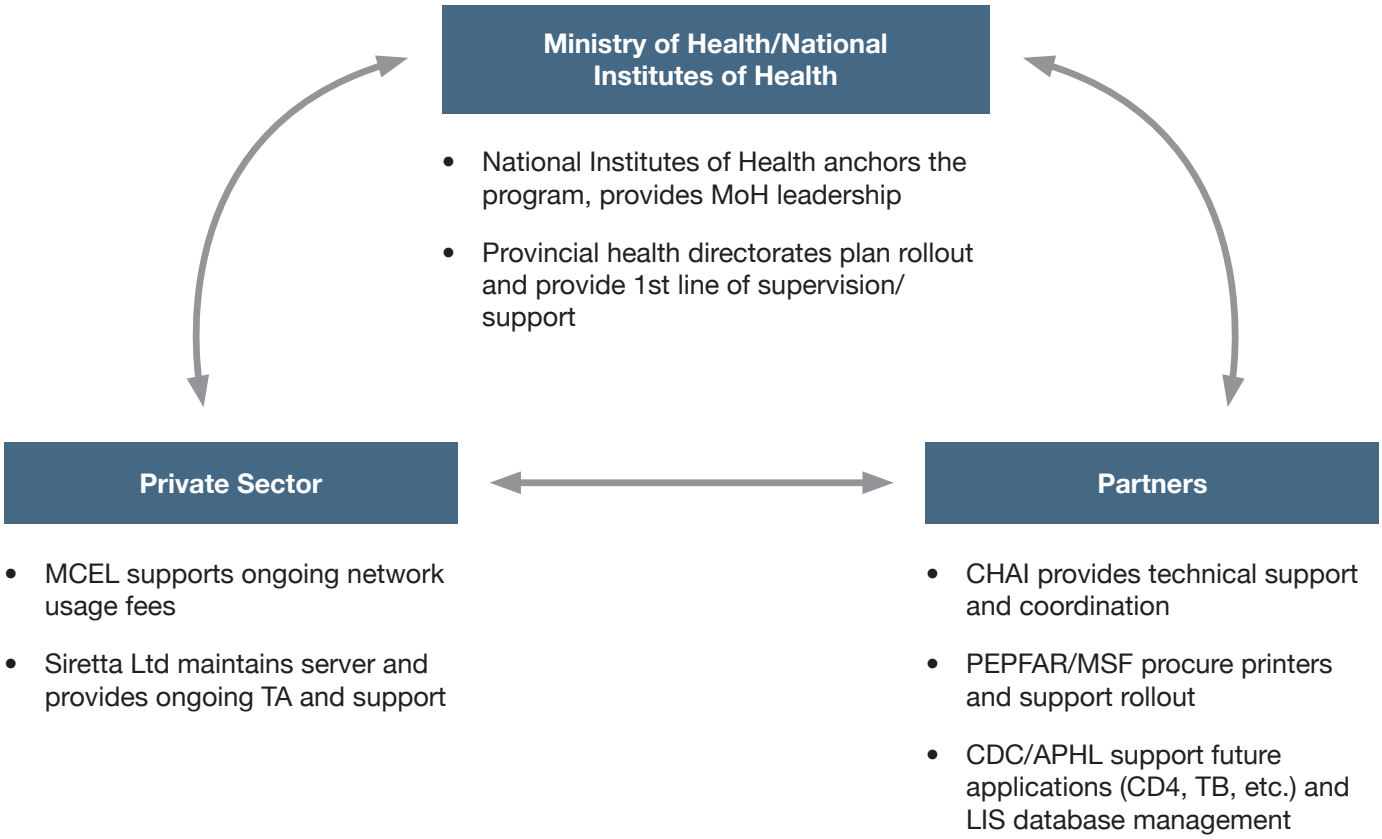
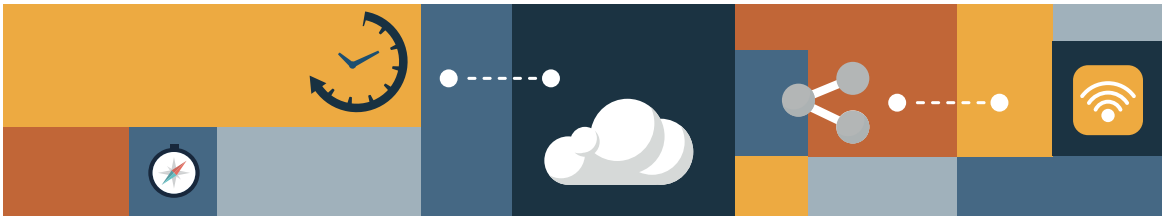


Figure 9. Government, Partner, and Private Sector Collaboration: Coordinated by CHAI, the ERS benefited from the support of public and private sector partners alike, providing the Ministry of Health with a turnkey program with committed financial support for 3 years.



Next Steps

The ERS has since been rolled out on a national basis in Mozambique (including over 275 health centres - fig 8) - less than 8 months after piloting - as the result of collaboration between government, partners, and the private sector (fig 9). While initially created to accelerate EID results, other tests such as CD4 and tuberculosis are currently being integrated. This approach, developed and tested, can be easily and rapidly be adapted for use in other countries.

Acknowledgments

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